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Sir:

Transmitted herewith for filing is the Patent Application of:

Inventor: **VIKTORS BERSTIS**

For: **METHOD AND SYSTEM FOR TRIGGERING ENHANCED SECURITY VERIFICATION IN RESPONSE TO ATYPICAL SELECTIONS AT A SERVICE-ORIENTED USER INTERFACE TERMINAL**

Enclosed are:

 _X_   Patent Specification and Declaration

 _X_   _4_   sheets of drawing(s).

 _X_   An assignment of the invention to International Business Machines Corporation (includes Recordation Form Cover Sheet).

 ___   A certified copy of a __ application.

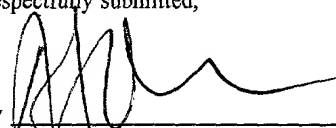 ___   Information Disclosure Statement, PTO 1449 and copies of references.

The filing fee has been calculated as shown below:

For	Number Filed	Number Extra	Rate	Fee
Basic Fee				$760.00
Total Claims	25 - 20	5	x 18 =	$90.00
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METHOD AND SYSTEM FOR TRIGGERING ENHANCED SECURITY VERIFICATION IN RESPONSE TO ATYPICAL SELECTIONS AT A SERVICE-ORIENTED USER INTERFACE TERMINAL

BACKGROUND OF THE INVENTION

1.   Technical Field:

This invention relates in general to a method and system for interfacing with customers at service-oriented terminals, and in particular to a method and system for service-oriented, user interface terminals where users make purchases electronically. Even more particularly, the invention relates to a system and method for automatically authorizing a remote point of purchase action at a facility which permits such actions. The system prompts a user with additional security-related questions when the user selects responses that deviate from the user's typical selections.

2.   Description of Related Art:

Service-oriented, user interface terminals for making purchases electronically, such as with a commercial credit card or debit card, are now common. These types of terminals are typically utilized wherever a basic or routine transaction can be processed more efficiently on site without the need for human intervention or judgment. Examples include fuel pumps of automotive refueling stations, automated vending machines for purchasing tickets for transportation (e.g., airline tickets), personalized greeting card vending machines, and the like. Users of such terminals tend to become repeat customers and, in many instances, select the same

set of options every time they make a transaction. For
example, whenever an individual uses his or her credit
card to purchase automotive fuel directly at the fuel
pump, he or she may always choose the premium grade of
5   fuel, never want a receipt, and always select the lowest
priced car wash.

        To use these terminals, users are merely required to
swipe their electronic card through a reading device
10   (thereby entering their account information into the
system) and wait for approval before selecting their
options. The ease and convenience of such transactions
tend to make such terminals easy targets for unauthorized
users. Although some terminals and/or electronic cards
15   also require users to enter a password or personal
identification number (PIN), this information also can be
easily compromised. Thus, an improved algorithm with
enhanced but not unduly difficult security features for
interfacing users of service-oriented terminals is
20   needed.

SUMMARY OF THE INVENTION

A method and system for prompting a repeat user of a payment card at an interface terminal with additional security-related questions when the user selects responses that deviate from his or her typical selections. The payment card is read at the terminal, its line of credit is authorized, and a profile of the user's purchasing habits is retrieved. The user then enters his or her current selection of options. A determination is then made as to whether the user's current selections match his or her user profile. If the user's current selections match the user profile, the process allows the user to obtain the services or facilities. If the user's current selections do not match the user profile, the process queries the user with additional security questions to ascertain whether the current user is an authorized user. If the user is unable to answer the security questions correctly, the process prevents the user from accessing the services or facilities. If the user is able to answer the security questions correctly, the process allows the current user to begin fueling his or her vehicle, for example.

Accordingly, it is an object of the invention is to provide a method and system for interfacing with customers at service-oriented terminals.

It is an additional object of the invention is to provide a method and system for service-oriented, user interface terminals where users make purchases electronically.

Yet another object of the invention is to provide a system and method for automatically authorizing a remote

point of purchase action at a facility which permits such actions.

5   Additional objects and advantages of the invention will become apparent in light of the description which follows.

BRIEF DESCRIPTION OF THE DRAWINGS

So that the manner in which the features, advantages and objects of the invention, as well as others which will become apparent, are attained and can be understood in more detail, more particular description of the invention briefly summarized above may be had by reference to the embodiment thereof which is illustrated in the appended drawings, which drawings form a part of this specification. It is to be noted, however, that the drawings illustrate only a preferred embodiment of the invention and is therefore not to be considered limiting of its scope as the invention may admit to other equally effective embodiments.

Figure 1 depicts a schematic diagram of an illustrative embodiment of an automated refueling station interface terminal constructed in accordance with the method and system of the present invention.

Figure 2 is a layer diagram of the programs in the data processing system of Figure 1 that cooperate to automatically connect to a remote data processing system according to the method and system of the present invention.

Figure 3 is a schematic diagram of an optional user interface terminal for the data processing system of Figure 1.

Figure 4 is a high level, logical flowchart of an illustrative embodiment of the method and system of the present invention utilized by the automated refueling station of Figure 1 for qualifying users of credit or debit cards.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The present invention may be executed in a variety
of systems including computer systems having various
operating systems. The computer system may be a personal
computer, a network computer, a midrange computer or a
mainframe computer. In addition, the computer may be a
stand-alone system or part of a network such as a local-
area network (LAN) or a wide-area network (WAN). For the
purposes of illustration, one embodiment of the present
invention, as described below, is implemented utilizing a
personal computer.

Referring now to Figure 1, there is depicted a block
diagram of a server 112. Server 112 includes a system
bus 210 that is connected to a central processing unit
(CPU) 212 and to memory, including read only memory (ROM)
214 and random access memory (RAM) 216. System bus 210
is coupled to a PCI local bus 218 through a PCI host
bridge 220. PCI local bus 218 is connected to additional
nonvolatile data storage devices, such as one or more
disk drives 222, and to an audio adapter 230 and a
graphics adapter 232 for controlling audio output through
a speaker 234 and visual output through a display device
236, respectively. A PCI-to-ISA bus bridge, such as
expansion bus bridge 238, connects PCI local bus 218 to
an ISA bus 240, which is attached (through appropriate
adapters) to a keypad 242 for receiving operator input.

Also included within server 112 are data ports for communicating with external equipment, such as other data processing systems. The data ports include, without limitation, a serial port 250 attached to ISA bus 240 for linking server 112 to remote data processing systems (such as a bridge) via a modem (not illustrated) and a communications adapter 252 attached to PCI bus 218 for linking server 112 to other stations of a LAN (such as clients).

Server 112 also contains software applications that are stored on the data storage devices and loaded into RAM 216 for execution by CPU 212. Among those applications is a communications program, such as communications manager 260, that manages the exchange of information between the LAN and remote data processing systems. Included in communications manager 260 is a connection initiator 261 for establishing dial-up connections to remote data processing systems. Communications manager 260 also includes Internet sharing software 262 that enables multiple LAN stations to access the Internet via a single connection. In the illustrative embodiment, server 112 also includes a connection schedule file 264, which preferably is stored in disk drive 222, and Internet sharing software 262 includes a request predictor 265 that utilizes connection schedule file 264 to trigger connection initiator 261 in advance of anticipated communication requests.

Connection schedule file 264 is maintained by a schedule editor and/or an automatic schedule modifier, each of which is preferably also included in Internet sharing software 262. Server 112 also includes a Web browser 270 and an E-mail client 280 that allow an

operator of server 112 or client to retrieve and view
information from the Internet and send and receive E-mail
via the Internet, respectively.

5   With reference now to Figure 2, there is depicted a
layer diagram of the software applications within server
112 that cooperate to provide the functionality of the
present invention according to the illustrative
embodiment. At the highest level of the layer diagram
10   are the software application programs 310, including
communications manager 260, web browser 270, and E-mail
client 280. At the intermediate level is an application
program interface (API) 320, through which application
programs 310 request services from the operating system
15   330. Operating system 330, which occupies the lowest
level of the layer diagram, is a network operating
system. As such, in addition to managing the operations
of server 112 (by performing duties such as resource
allocation, task management, and error detection),
20   operating system 330 also provides tools for managing
communications within the LAN and between LAN stations
and remote data processing systems. Included within
operating system 330 is a kernel 332 that manages the
memory, files, and peripheral devices of server 112. The
25   lowest level also includes device drivers, such as a
keypad driver 340 that kernel 332 utilizes to manage
input from and output to peripheral devices.

30   For purposes of illustration of the invention, an
automotive refueling station having a fuel pump equipped
with a user interface terminal 81 (Figure 3) is
described. Terminal 81 includes a display screen 83 and
option buttons 85 that can be selected by the user when
prompted by the system.

Referring now to Figure 4, there is illustrated one
embodiment of a high level, logic flow diagram of a
method for prompting repeat users of payment and/or
identification cards, at interface terminals with
additional security-related questions when the users
select responses that deviate from their typical
selections. Note that the present invention is capable
of tracking the selections of an authorized user across
multiple interface terminals while he or she is using
cards with different account numbers. Alternatively, the
invention is also adapted to track the selections of an
authorized user at individual interface terminals with a
single card, or any combination of these scenarios.

In one embodiment, a fuel pump is equipped with the
terminal 81 of Figure 3, and the algorithm begins as
illustrated at block 401 (Figure 4). A credit or debit
card for purchasing fuel at a fuel pump is scanned or
read, as shown in block 403. The credit or debit card
may be any electronically, magnetically, optically, or
otherwise scanned device. As depicted in block 405, a
determination is then made as to whether or not a line of
credit or debit is authorized by the card issuer. If the
card is not authorized, the process proceeds to block
407. Block 407 illustrates displaying within display
screen 83 "See attendant," "Authorization denied," or
similar message for conveying to the user that an
alternate means of payment is required.

If the card is authorized, the process proceeds to
block 409. Block 409 depicts the retrieval of a user
profile (UP) for the authorized user of the card. The
user profile represents the routine or typical selections
that this particular user chooses when given the same
choice of options at each visit. For example, when the

user utilizes his or her card at the fuel pump of a
refueling station, the user is always prompted by the
following inquiries: (a) "Would you like a receipt for
this purchase?"; (b) "Select fuel grade."; (c) "Would you
like a car wash?", and, if so, (d) "Select type of car
wash." Since some users tend to select the same set of
options at every visit, a user profile of the typical
selections for each user can be generated. For example,
in the last *n* visits (e.g., five visits), the user has
never requested a receipt, always selected premium
unleaded fuel, and always purchased an economy car wash.
This hypothetical user's purchase habits readily generate
a user profile that can be used as a low-level security
check or threshold for determining whether an
unauthorized user is using the card.

After the user's profile is obtained, as depicted in
block 409, the process proceeds to block 411 wherein the
user enters his or her current selection of options. A
determination is then made whether the user's current
selections match his or her user profile, as illustrated
in block 413. Alternatively, a limited number of
selections (e.g., one or two) that are inconsistent with
the authorized users typical answers may be allowed. If
the user's current selections match or are similar to the
user profile, the process proceeds to block 415. Block
415 illustrates displaying a "Begin fueling" message to
the user. If the user's current selections do not match
the user profile or, alternatively, are not within a
desired range of consistency with the user profile, the
process proceeds to block 417. Block 417 depicts a
determination of whether the current user can answer
selected questions with information that an authorized
user would possess. The questions posed to the current
user can number one or more, and may be varied in

difficulty. Possible prompts include: "enter your zip
code," "enter your phone number," or, "enter your
password or PIN," to name a few. In addition questions
of a more personal, differentiating nature may also be
queried. Thus, block 417 represents a security check for
screening users who, at the very least, are selecting
atypical options for the card, or worse, users who are
unauthorized to use the card.

If the current user is unable to answer the security
question(s) of block 417 correctly, the process again
proceeds to block 407, which illustrates displaying a
"See attendant," "Authorization denied," or similar
message for conveying to the current user that alternate
means of payment are required. If the current user is
able to answer the security question(s) of block 417
correctly, the process proceeds to block 415 which
depicts permitting the current user to begin fueling his
or her vehicle. Block 419 illustrates a determination of
whether a "fueling complete" signal has been received by
the process. When the user has completed the fueling of
his or her vehicle the fueling complete signal is
received by the process, and the process exits as
illustrated at block 421.

The present invention has several advantages. The
process allows current users of credit or debit cards to
be screened for security purposes based upon their
selection of options. If the option selected by the
current user are inconsistent or atypical for the
authorized user of the card, the process prompts the
current user with additional security-related questions
in an attempt to prevent unauthorized use of the card.

It is also important to note that, although the
present invention has been described in the context of a
fully functional computer system, those skilled in the
art will appreciate that the mechanisms of the present
invention are capable of being distributed as a program
product in a variety of forms, and that the present
invention applies equally regardless of the particular
type of signal-bearing media utilized to actually carry
out the distribution. Examples of signal-bearing media
include, but are not limited to, recordable-type media
such as floppy disks or CD-ROMs and transmission-type
media such as analogue or digital communications links.

CLAIMS:

What is claimed is:

1   1.   A method for automatically authorizing a remote
2   point of purchase action at a facility which permits such
3   actions, said method comprising the steps of:

4   storing selections made by an authorized user during
5   a previous transaction;

6   prompting a user with options during a current
7   transaction at the facility;

8   comparing options selected by the user with
9   prestored selections;

10   requiring the user to answer a security-related
11   question if the options selected by the user are
12   inconsistent with the prestored selections; and

13   thereafter permitting the current transaction only
14   if the user correctly answers said security-related
15   question.

1   2.   The method of claim 1 wherein the step of storing
2   selections comprises generating a user profile of
3   selections made by the user during the last n
4   transactions.

1   3.   The method of claim 1 wherein the step of storing
2   selections comprises storing selections made by the user
3   at a plurality of facilities.

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3

4.   The method of claim 1 wherein the step of storing
selections comprises storing selections made by the user
while using a credit or debit card.

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5.   The method of claim 1 wherein the step of storing
selections comprises storing selections made by the user
while using a plurality of credit or debit cards, wherein
each of the credit or debit cards has a different account
number.

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6.   The method of claim 1 wherein the step of requiring
the user to answer a security-related question requires
the user's current selections to be substantially
inconsistent with the prestored selections.

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7.   The method of claim 1 wherein the step of requiring
the user to answer a security-related question is
predicated on the user's current selections being
identical to the prestored selections.

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8.   The method of claim 1 wherein the step of requiring
the user to answer a security-related question entails
requiring the user to answer a plurality of security-
related questions, and wherein the step of permitting the
current transaction requires the user to answer each of
the security-related questions correctly.

1   9.   A method for automatically authorizing a remote

2   point of purchase action with a credit or debit card at

3   facilities which permit such actions, said method

4   comprising the steps of:

5   storing selections made by an authorized user during

6   the previous n transactions with the credit or debit card

7   at the facilities and generating a user profile in

8   response thereto;

9   prompting a current user with options during a

10   current transaction with the credit or debit card at one

11   of the facilities;

12   comparing options selected by the current user with

13   the user profile;

14   requiring the current user to answer a security-

15   related question if the options selected by the current

16   user are inconsistent with the user profile; and then

17   permitting the current transaction only if the

18   current user correctly answers said security-related

19   question.

1   10.   The method of claim 9 wherein the step of storing

2   selections comprises storing selections made by the

3   authorized user while using a plurality of credit or

4   debit cards at various ones of the facilities, wherein

5   each of the credit or debit cards has a different account

6   number.

1   11.   The method of claim 9 wherein the step of requiring
2   the current user to answer a security-related question
3   requires the current user's current selections to be
4   substantially inconsistent with the user profile.

1   12.   The method of claim 9 wherein the step of requiring
2   the current user to answer a security-related question is
3   predicated on the current user's current selections being
4   identical to the user profile.

1   13.   The method of claim 9 wherein the step of requiring
2   the current user to answer a security-related question
3   entails requiring the current user to answer a plurality
4   of security-related questions, and wherein the step of
5   permitting the current transaction requires the current
6   user to answer each of the security-related questions
7   correctly.

1   14. A system for automatically authorizing a remote
2   point of purchase action at a facility which permits such
3   actions, comprising:

4   a memory for storing previous selections made by an
5   authorized user;

6   a user terminal adapted to prompt a user with
7   options during a transaction at the facility;

8   processor means for comparing options selected by
9   the user at the user terminal during a current
10   transaction with the previous selections stored in the
11   memory;

12   control means for requiring the user to answer a
13   security-related question when the options selected by
14   the user at the user terminal during the current
15   transaction are inconsistent with the previous selections
16   stored in the memory, and for thereafter permitting the
17   current transaction only when the user correctly answers
18   said security-related question.

1   15. The system of claim 14 wherein the memory generates
2   a user profile of selections made by the user during the
3   last n transactions.

1   16. The system of claim 14 wherein the user terminal is
2   a device for reading a credit or debit card.

1   17. The system of claim 14 wherein the control means
2   requires the user to correctly answer a plurality of
3   security-related questions.

18.   A computer program product, residing on a computer usable medium and having computer usable program means embodied therein, said computer usable program means comprising:

     means for storing selections made by an authorized user during a previous transaction;

     means for prompting a user with options during a current transaction at the facility;

     means for comparing options selected by the user with prestored selections;

     means for requiring the user to answer a security-related question if the options selected by the user are inconsistent with the prestored selections; and

     means for permitting the current transaction only if the user correctly answers said security-related question.

19.   The computer program product of claim 18 wherein the means for storing selections generates a user profile of selections made by the user during the last n transactions.

20.   The computer program product of claim 18 wherein the means for storing selections stores selections made by the user at a plurality of facilities.

21.   The computer program product of claim 18 wherein the means for storing selections stores selections made by the user while using a credit or debit card.

22. The computer program product of claim 18 wherein the
means for storing selections stores selections made by
the user while using a plurality of credit or debit
cards, wherein each of the credit or debit cards has a
different account number.

23. The computer program product of claim 18 wherein the
means for requiring the user to answer a security-related
question is predicated on the user's current selections
being substantially inconsistent with the prestored
selections.

24. The computer program product of claim 18 wherein the
means for requiring the user to answer a security-related
question is predicated on the user's current selections
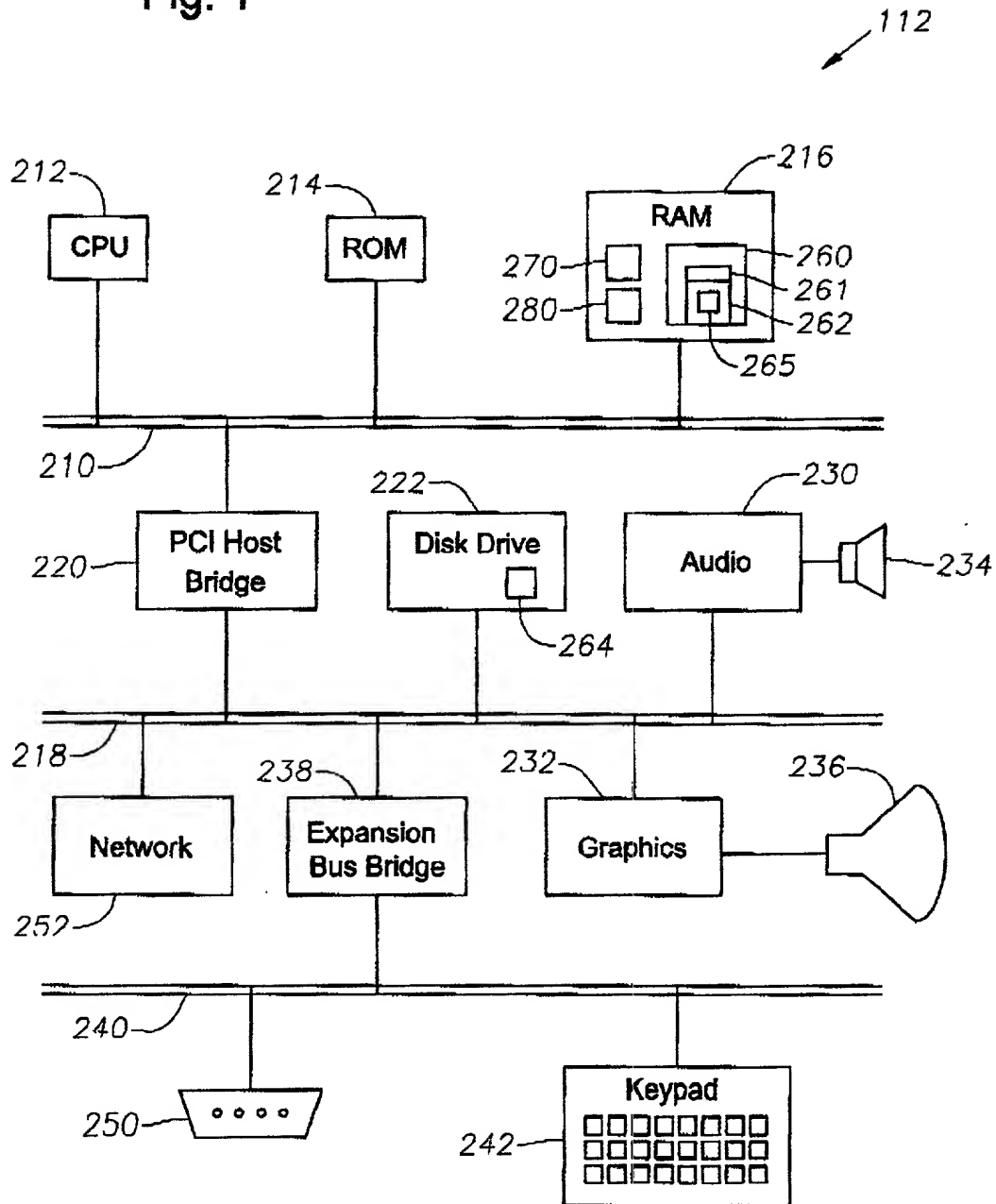being identical to the prestored selections.

25. The computer program product of claim 18 wherein the
means for requiring the user to answer a security-related
question entails requiring the user to answer a plurality
of security-related questions, and wherein the means for
permitting the current transaction requires the user to
answer each of the security-related questions correctly.

ABSTRACT OF THE DISCLOSURE

METHOD AND SYSTEM FOR TRIGGERING ENHANCED SECURITY VERIFICATION IN RESPONSE TO ATYPICAL SELECTIONS AT A SERVICE-ORIENTED USER INTERFACE TERMINAL

A method and system for prompting a repeat user of a payment card at an interface terminal with additional security-related questions when the user selects responses that deviate from his or her typical selections. The payment card is read at the terminal, its line of credit is authorized, and a profile of the user's purchasing habits is retrieved. The user then enters his or her current selection of options. A determination is then made as to whether the user's current selections match his or her user profile. If the user's current selections match the user profile, the process allows the user to obtain the services or facilities. If the user's current selections do not match the user profile, the process queries the user with additional security questions to ascertain whether the current user is an authorized user. If the user is unable to answer the security questions correctly, the process prevents the user from accessing the services or facilities. If the user is able to answer the security questions correctly, the process allows the current user to begin fueling his or her vehicle.

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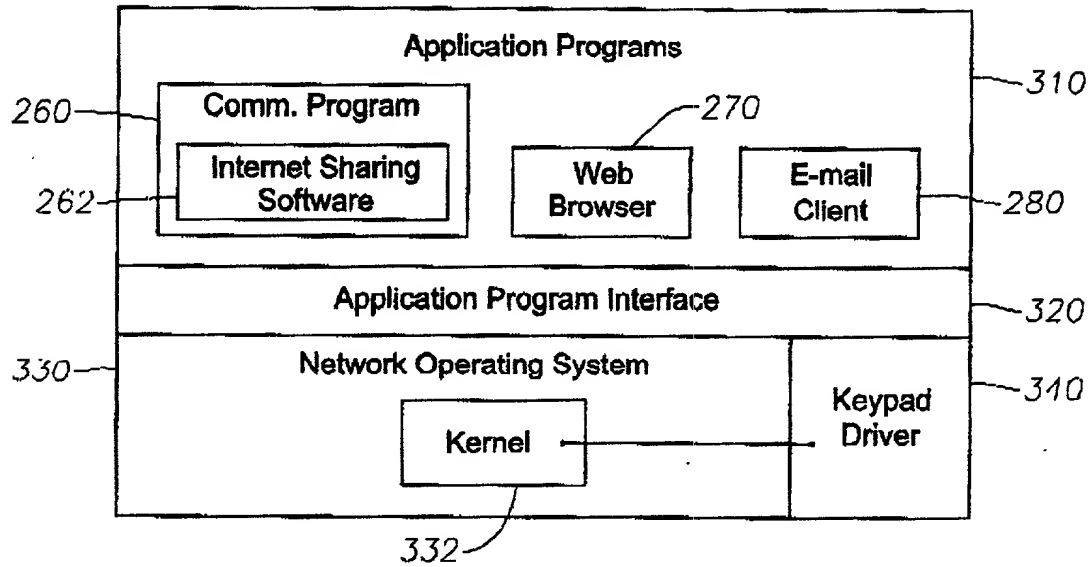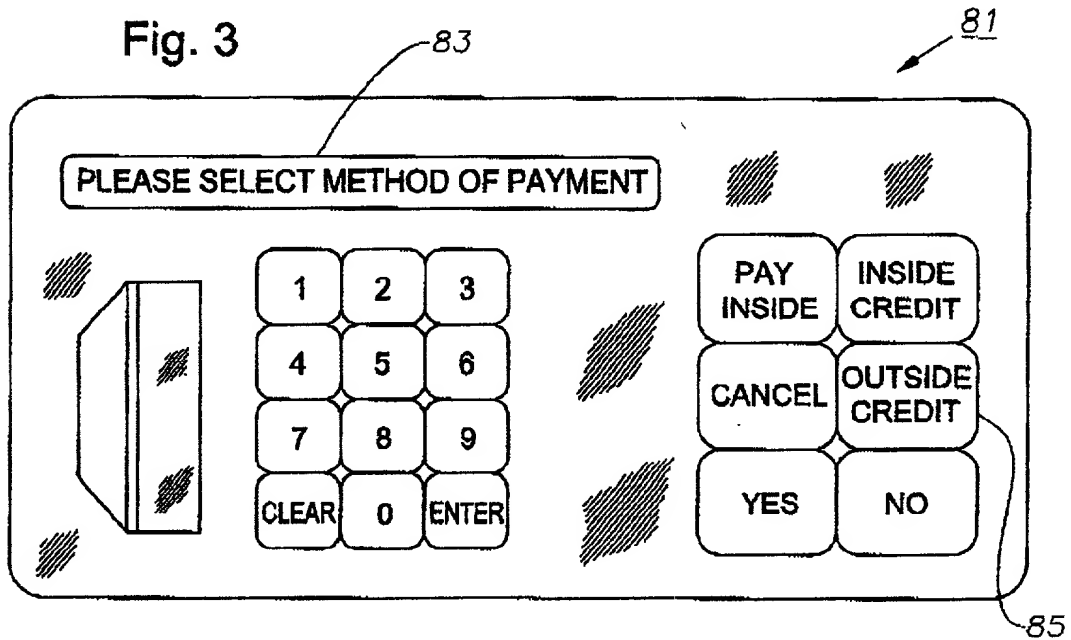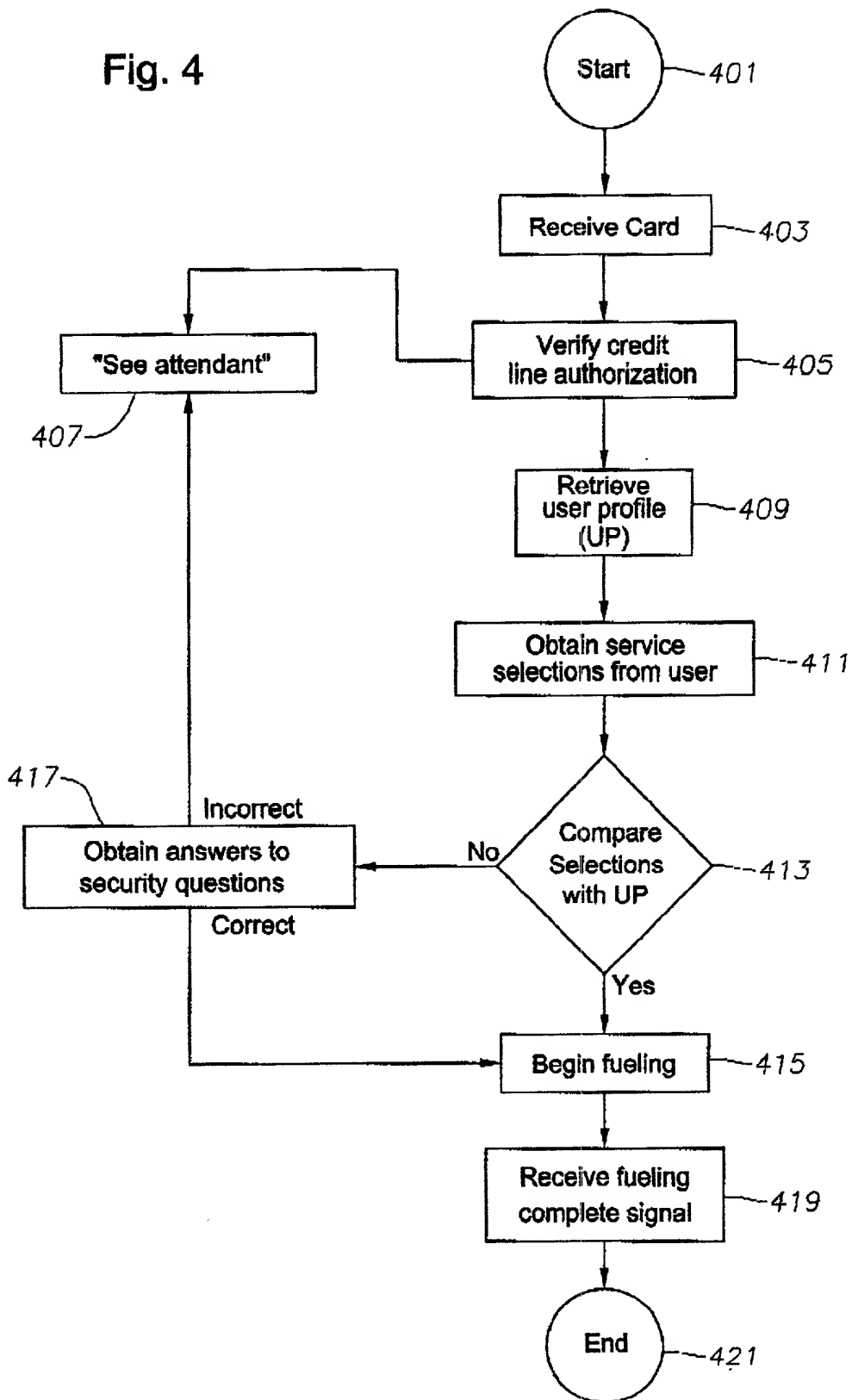## Fig. 1

112

212 — CPU

214 — ROM

216 — RAM
270 — 260
280 — 261
262
265

210

222 — Disk Drive
220 — PCI Host Bridge
230 — Audio
234
264

218
238 — Expansion Bus Bridge
232 — Graphics
236
252 — Network

240

250

242 — Keypad

Fig. 2

Application Programs			310

Comm. Program — 260

Internet Sharing Software — 262

Web Browser — 270

E-mail Client — 280

Application Program Interface — 320

Network Operating System — 330

Kernel — 332

Keypad Driver — 310

Fig. 3

— 83   81

PLEASE SELECT METHOD OF PAYMENT

1	2	3
4	5	6
7	8	9
CLEAR	0	ENTER

PAY INSIDE	INSIDE CREDIT
CANCEL	OUTSIDE CREDIT
YES	NO

85

Fig. 4

DECLARATION AND POWER OF ATTORNEY FOR

PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name;

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

METHOD AND SYSTEM FOR TRIGGERING ENHANCED SECURITY VERIFICATION IN RESPONSE TO ATYPICAL SELECTIONS AT A SERVICE-ORIENTED USER INTERFACE TERMINAL

the specification of which (check one)

X is attached hereto.

__ was filed on _____
   as Application Serial No. _____
   and was amended on _____
                        (if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, §1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s):   Priority Claimed

                                                        ___ Yes___ No
_____ _____ _____
   (Number)   (Country)   (Day/Month/Year)

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose information material to the patentability of this application as defined in Title 37, Code of Federal Regulations, §1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

_____ _____ _____
(Application Serial #)   (Filing Date)   (Status)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and

further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorneys and/or agents to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

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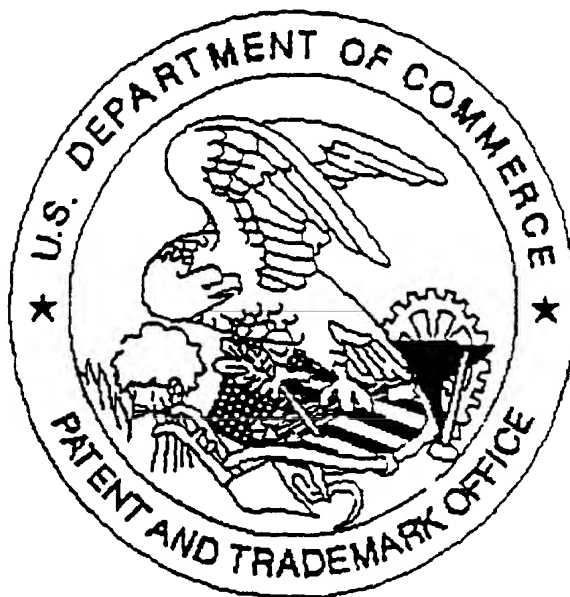
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